ECTP 2015

Programme & Abstracts

2nd EUROPEAN CONGRESS ON TATTOO AND PIGMENT RESEARCH

29-30 April 2015 ◆ Bruges ◆ Belgium

28 April 2015:
Pre-Congress Seminar on Coming EU Regulations on Tattooing

Bruges

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DEAR PARTICIPANT

On behalf of the ESTP and ECTP Board, we are pleased to welcome you to the 2nd Congress on Tattoo and Pigment Research in Bruges.

We have prepared an interesting scientific programme covering the different aspects of tattooing. Taking your feedback and suggestions from the 1st ECTP Congress in Copenhagen into account, we did our best to make sure that it will fulfil your expectations. Thanks to eminent experts and speakers, the programme offers a number of excellent sessions on tattoo epidemiology and practices, public health issues, clinical complications of tattooing, therapy and laser removal of tattoos and much more. This year, the congress will start with a Pre-Congress Seminar, held on 28 April, with a focus on coming EU Regulations on Tattooing. There will be key note speakers from the EU, the tattoo ink producers and the European Society of Tattoo and Pigment Research (ESTP).

We hope you will enjoy the congress as well as the beautiful historic city of Bruges. The city has a long tradition of hospitality, trade and art. It has always been a forum for international exchange. We hope you will enjoy the scenery, the gastronomy and that you will spare some time to relax with a good beer in good company; the best moment to exchange ideas and make plans for the future.

We look forward to welcoming you to the 2nd Congress on Tattoo and Pigment Research.

A warm welcome to Bruges!

On behalf of the organising committee

Christa De Cuyper,
ECTP2015 Congress Chair

Jørgen Serup,
ESTP Research Chairman

ECTP ORGANISATION

Local Organising Committee:
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Dermatology Department, AZ Sint-Jan, Bruges, Belgium

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University Hospital KU Leuven, Leuven, Belgium

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Skin & Laser Clinic, Antwerpen, Belgium

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Objective of the European Society of Tattoo and Pigment Research (ESTP):
To advance new and original medical, chemical, physical, toxicological, psychological, anthropological, social and other aspects of academic research on tattoos in man including any aspect of pigment and dye research.

The fulfillment of the object shall be shared in cooperation with researchers in any country or region of the world irrespective the primary geography of operations of the Society is Europe and the national states of this region.

Find the statues at their full length on: www.estpresearch.org

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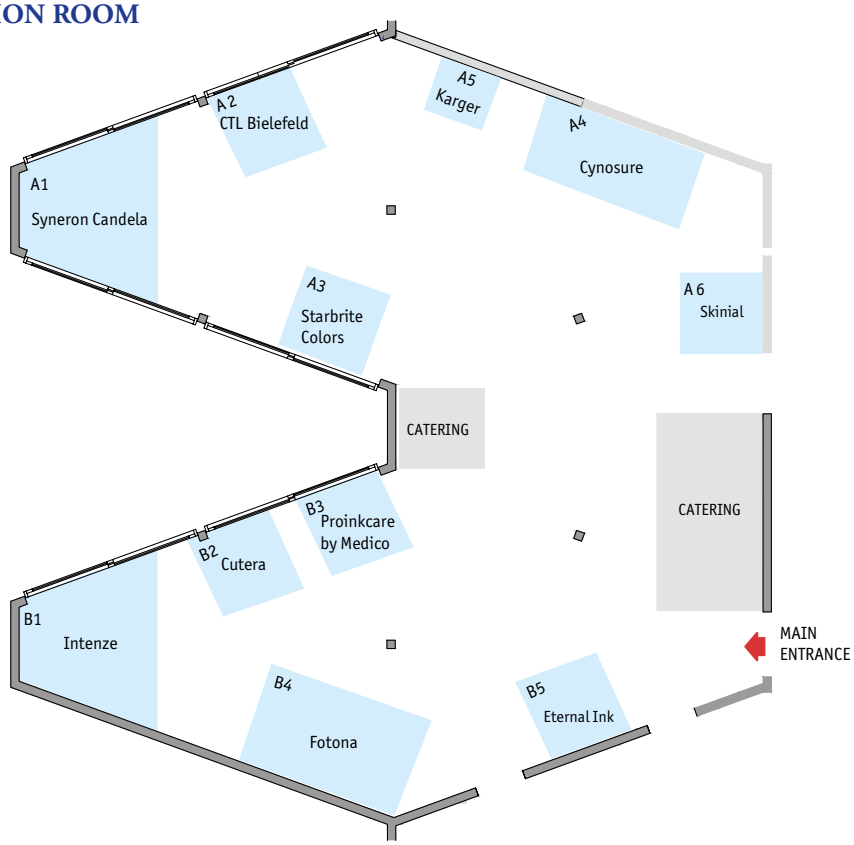
EXHIBITION ROOM



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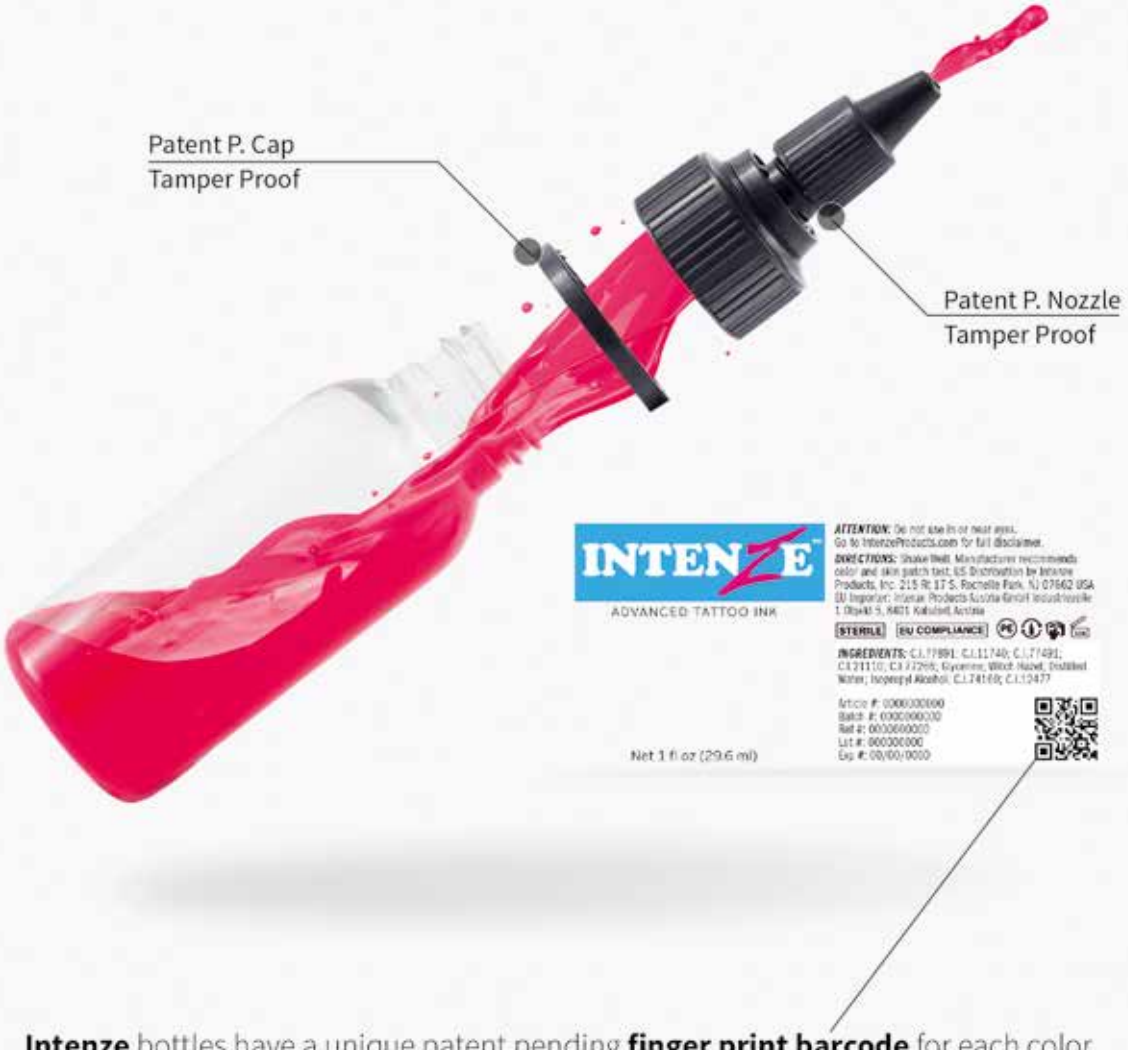

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PROGRAMME

28 APRIL 2015, PRE-CONGRESS SEMINAR		
12:30-13:30	**Registration, coffee & snacks**	
13:30-14:25	**PRE-CONGRESS SEMINAR: COMING EU REGULATION ON TATTOOING PART 1**	
	Welcome and opening of the seminar	Christa de Cuyper, Belgium
	1 Tattoos in Europe: epidemiology and the business of tatooing	Nicolas Kluger, Finland
	2 Complications of tattoos we see and those we fear: focused vs seamless prevention	Jørgen Serup, Denmark
	3 State of art of basic science and tattoos as a prerequisite to regulation	Wolfgang Bäumler, Germany
14:25-14:45	*Coffee and exhibition*	
14:45-15:45	**PART 2**	
	4 EU actions to ensure the safety of tattoos and the protection of consumers	Ana Blass-Rico, Belgium
	5 The coming EU/CEN standard for tattoo hygiene in Europe	Andy Schmidt, Germany
	6 Surveillance of adverse tattoo events	Cécile Verdier, France
15:45-16:05	*Soft drinks and exhibition*	
16:05-17:15	**PART 3**	
	7 Tattoo inks, chemical analysis and pigments relative to regulatory requirements	Gerald Prior, Germany
	8 What can realistically be implemented and followed: the German perspective	Peter Laux, Germany
	9 What can realistically be implemented and followed: the Italian experience	Alberto Renzoni, Italy
	Panel discussion	

29 APRIL 2015		
8:00-9:00	**Registration and coffee**	
9:00-9:30	**WELCOME AND OPENING**	Christa de Cuyper & Jørgen Serup
	Welcome and opening of the congress by the Congress Chair	Christa de Cuyper, Chair of ECTP2015
	The European Society of Tattoo and Pigment Research (ESTP): science and pragmatism	Jørgen Serup, Chairman of ESTP
9:30-11:00	**HISTORY – EPIDEMIOLOGY AND TATTOOING OF TODAY INCLUDING SUMMARY OF PRE-CONGRESS SEMINAR**	Anne Laumann & Christa de Cuyper
	10 From ancient tattoos to tattooing of today	Anne Laumann, USA
	11 Foreign Bodies, Pigments & Contagion: The 19th Century European Tattoo and Risks to Health	Gemma Angel, United Kingdom
	12 Epidemiology of Tattoos	Florian Walter, United Kingdom
	13 Tattooing, future development and trends with a review of the pre-congress seminar	Wolfgang Bäumler, Germany
11:00-11:30	*Coffee and exhibition*	
11:30-13:00	**PUBLIC HEALTH ISSUES**	Wolfgang Bäumler & Nicolas Kluger

	14 Can a person with known nickel allergy become tattooed?	Carola Lidén, Sweden
	15 Photocarcinogenicity and black tattoos, screen effect of pigment and delay of skin cancer development	Mitra Sepehri, Denmark
	16 The Danish EPA risk assessment of tattoo inks	Dorte Lerche, Denmark
	17 Predictive value of risk assessment indices: risk that risk assessment is misleading	Jørgen Serup, Denmark
	Questions and discussion	
13:00-14:00	*Lunch, exhibition & paper poster viewing*	
14:00-15:45	**PARALLEL WORKSHOP 1: TATTOO INK AND MANUFACTURING OF INKS OF IMPROVED SAFETY**	Urs Hauri & Jørgen Serup
	18 Manufacturing of safer tattoo inks in the future: the European ambition	Ralf Michel, Germany
	Manufacturing of safer tattoo inks in the future: the US ambition	Mario Barth, Austria
	20 Chemical analysis of inks according to ResAp(2008)1: are tests accurate and relevant?	Urs Hauri, Switzerland
	21 Persistence and survival of bacterial strains in sterilized tattoo inks	Lucia Bonadonna, Italy
	22 Methods for sterilisation of tattoo inks: efficiency and product interaction	Michael Dirks, Germany
	Questions and discussion	
14:00-15:45	**PARALLEL WORKSHOP 2: TATTOOING, TATTOOISTS, APPLICATIONS AND PERFORMANCE**	Christa de Cuyper & Frank Rosenkilde
	23 Tattooing, what's good and what's bad	Liz Kierstein, Denmark
	24 The aftercare jungle	Mel Dredd, Denmark/Australia
	25 How to avoid problems with permanent cosmetics	Joëlle Senden, Belgium
	26 Tattooing as adjunctive tool for surgical scars	Darline Vierstrate, Belgium
	Questions and discussion	
15:45-16:15	*Coffee and exhibition*	
16:15-17:15	**WORKSHOP REPORTS AND DISCUSSION**	
	Round table discussion, Q&A, reports from parallel sessions	Mario Barth & Andy Schmidt
		Frank Rosenkilde & Jørgen Serup
19:30-	**Conference Dinner at Brewery De Halve Maan, Bruges**	

30 APRIL 2015		
8:00-8:30	**Registration and coffee**	
8:30-9:30	**ORAL ABSTRACT PRESENTATIONS**	Alberto Renzoni & Jørgen Serup
	27 Extension of surveillance activities in Italy: determination of polycyclyc aromatic hydrocarbons in tattoo inks containing carbon black	Manuela Agnello, Italy
	28 The Korean Tattooist Survey: A web-based survey	Jeon-Su Park, Korea
	29 Health in the Tattoo Industry: an Observational Study of 448 French Tattooists	Nicolas Kluger, Finland
	30 Tattooing, latex and life-threatening allergy	Katrina Hutton Carlsen, Denmark
9:30-10:45	**CLINICAL COMPLICATIONS OF TATTOOING**	Nicolas Kluger & An Goossens
	31 Diagnosis and spectrum of clinical complications of tattooing	Jørgen Serup, Denmark
	32 Complications of allergic reactions to temporary tattoos	An Goossens, Belgium

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	33 What contra-indicates tattooing?	Nicolas Kluger, Finland
	34 Leprosy on tattoos	Ashok Ghorpade, India
	35 New frontiers of medical tattoos	Alberto Renzoni, Italy
10:45-11:15	*Coffee and exhibition*	
11:15-12:15	**THERAPY AND LASER REMOVAL**	Serge Coopman & Johan Snauwaert
	36 Laser removal of tattoos reviewed	Serge Coopman, Belgium
	37 Pico-second lasers, new generation instruments for tattoo removal	Maurice Adatto, Switzerland
	38 Tattoo pigment decomposition – from predictive pyrolysis to laser irradiation	Ines Schreiver, Germany
	39 New developments: From nanoseconds to femtoseconds, facts and fiction	Wolfgang Bäumler, Germany
12:15-13:30	*Lunch, exhibition & paper poster viewing* **The Annual General meeting of ESTP will take place during the break**	ESTP RESEARCH
13:30-15:10	**PARALLEL WORKSHOP 3: BIOKINETICS AND TOXICOLOGY**	Wolfgang Bäumler & Peter Laux
	40 Tattoo ink toxicology, the known, the unknown and the scientific challenge of the future	Wolfgang Bäumler, Germany
	41 Tattoos – from skin to lymph nodes and beyond?	Vivien Schacht, Germany
	42 Identification of tattoo pigments in biological samples	Harald Jungnickel, Germany
	43 Light induced decomposition of tattoo pigments	Urs Hauri, Switzerland
	Questions and discussion	
13:30-15:10	**PARALLEL WORKSHOP 4: HYGIENE, PRACTICE AND GUIDELINES**	Thijs Veenstra & Jens Bergström
	44 The German, Dutch and British tattoo hygiene guidelines in view of the coming EU/CEN standard	Thijs Veenstra, the Netherlands
	45 Workplace hygiene and the Swedish standard, a model for "Good Tattoo Practice"	Jens Bergström, Sweden
	46 Survey of studies on microbial contamination of marketed tattoo inks	Lucia Bonadonna, Italy
	47 Tattooing, law and institutions: The French Case	Olivier Laizé, France
	Questions and discussion	
15:10-15:25	*Coffee and exhibition*	
15:25-16:10	**WORKSHOP REPORTS AND DISCUSSION**	
	Round table discussion, Q&A, reports from parallel sessions	Wolfgang Bäumler & Peter Laux
		Thijs Veenstra & Jens Bergström
16:10-16:30	**CLOSING OF THE CONGRESS WITH ANNOUNCEMENT OF COMING EVENTS**	Christa De Cuyper & Jørgen Serup

POSTER PRESENTATIONS

P1	Determination of metals in tattoo and permanent make-up inks	Gordana Milojevic Miodragovic
P2	Tattoo and adverse reactions: a terrible ghost	Antonella Tammaro
P3	Belgian superior health council advisory report on tattoo and PMU safety	Christa De Cuyper
P4	Influencing the immune response of the skin to tattoo pigments by controlled Layer by Layer encapsulation	Stefanie Müller
P5	Survey on tattooing practice in Belgium	Sam Dekeyser
P6	Clinical cases of adverse event	Sebaastian van der Bent
P7	New clinical classification of tattoo reactions	Mitra Sepehri
P8	Adsorption of heavy metal ions in tattoos ink by modified bentonite clay	Birnur Akkaya
P9	To cure by tattooing scars?	Camille Gravelier
P10	Complications with body art. Beware if you care!	Christa De Cuyper
P11	Tattooing is an art	Christa De Cuyper

GENERAL INFORMATION

Venue
AZ Sint-Jan
Ruddershove 10,
8000 Bruges, Belgium

Congress hours
Pre-Congress Seminar, 28 April:
Registration: 12:30-13:30
Exhibition: 14:00-16:00
Scientific programme: 13:30-17:15

29 April
Registration: 8:00-12:00
Exhibition: 8:30-16:00
Scientific programme: 9:00-17:15

30 April
Registration: 8:00-12:00
Exhibition: 8:30-16:00
Scientific programme: 8:30-16:30

Certificate of attendance
Certificates of attendance can be collected at the registration desk on 30 April 2015.

Lunch and coffee
Lunch and coffee is included in the registration fee. It is served in the exhibition area.

Internet
Free Wi-Fi is available in the congress area.
A Wi-Fi code can be collected at the registration desk.

Entitlements
Registration for the congress includes admission to the full congress programme (excl. pre-congress), coffee breaks and lunch, congress bag, programme and abstract book, as well as the just launched Karger AG book "Tattooed skin and health".

Transport
Direct busses run from the railway station in Bruges to AZ Sint Jan.
No. 13 is the best choice from and to the railway station, via t'Zand and the city centre (every 20 minutes).
An alternative bus is no. 23 from and to the station via Waggelwater-Blauwe toren (every 20 minutes)
Bus tickets can be purchased on the bus or in front of the railway station.

Information for speakers
Please bring your presentation on a USB stick. Please upload your presentation to the computer in the auditorium. A folder divided into each session will indicate where you should place the presentation. A technician will be present to assist you if you have any problems. Please upload your presentation before your session starts.

Please note that we do not allow use of personal laptops for presentations. At the end of the congress, all presentations will be deleted in order to secure that no copyright issues will arise.

Information for poster presenters
Poster mounting: Posters can be mounted 29 April 2015 from 8 am when the registration starts.
If you participate in the pre-congress on 28 April, it will also be possible to mount the poster on this day. The ECTP Secretariat will provide all necessary equipment to mount the posters.

Poster removal: Posters can be removed after the last session on 30 April at 16:30.

Visit the poster area: Participants are encouraged to visit the poster area in the coffee and lunch breaks. Participants can attach their business card to the poster and expect to be contacted by the author during the congress or later as appropriate.

SOCIAL EVENT

Congress dinner 29 April 2015 at 19:30 (Not included in the registration fee)

The congress dinner will take place at the Brewery "De Halve Maan" in Bruges. The dinner will begin with beer tasting and guided tours in the brewery where the different brewing techniques will be revealed, as well as the interesting history of the brewery. The brewery is situated in the historic city centre of Bruges where you will find beautiful cultural sites and picturesque cobbled lanes and canals.

Dress code: Casual

Address: Huisbrouwerij De Halve Maan, Walplein 26, 8000 Bruges.

ESTP research

European Society of Tattoo and Pigment Research

ABOUT

the European Society of Tattoo and Pigment Research (ESTP)

The European Society of Tattoo and Pigment Research (ESTP) was inaugurated during the 1st ECTP Congress which took place in Copenhagen, Denmark, 13-14 November 2013.

The main objectives of the ESTP are to advance academic research on tattoos, to deliver independent expert advice, to educate the medical community and other groups of professionals in all aspects of tattoos, to advance the manufacturing, distribution and sales of safer tattoo ink and to develop and support research projects, guidelines and publications.

The ESTP will organise a recurring congress in the field to secure a high level of knowledge sharing and networking.

During the ECTP 2015 Congress, the Annual General Meeting of ESTP will take place.
All members of the ESTP are invited to join the meeting during lunch on 30 April.
A membership of the ESTP offers the member a number of benefits:

- Reduced congress fee
- Membership diploma
- Representation and a voice in regulatory bodies controlling tattooing in Europe
- Education as well as more benefits are to be developed by the society exemplified by the just launched Karger AG book "Tattooed skin and health".

We encourage you to become a member of the society. Please, fill in the membership form which can be obtained during the congress at the registration desk. You are also welcome to register through the ESTP website.

Society statues are available on the ESTP website: www.estpresearch.org

On behalf of the ESTP,

Jørgen Serup,
Chairman of the ESTP
Professor, Department of Dermatology,
the Tattoo Clinic, Bispebjerg University Hospital
Copenhagen, Denmark

ABSTRACTS

1

TATTOOS IN EUROPE: EPIDEMIOLOGY AND THE BUSINESS OF TATTOOING

Nicolas Kluger[1]

[1]*Helsinki University Central Hospital; (Helsinki, Finland*)

In 1974, the first professional French tattooist C. Bruno wrote a book, entitled 'Tatoués, qui êtes-vous?', depicting his experience as a tattooist in the picturesque Pigalle tourist district of Paris. However, we have come a long way since then. Tattooing has gained remendous visibility, notoriety and popularity in Western countries. In Germany, 8.5% of the population (aged between 14 and 90 years) has a tattoo. Similar trends have been found in France, Finland and Australia, where approximately 10% of the populations have at least one tattoo. However, the overall tattoo prevalences overseas and in Europe are even higher, especially among the youth, for whom it is up to 15–25% according to the country. Much has been written about the tattooed and tattooists. However, who are they currently? What motivates them to get tattooed and give tattoos? How do they see themselves? Why do some individuals remove their tattoos? Is there a 'profile' of the tattooed? Are they really 'risk takers'? And how do the non-tattooed perceive them? Through a critical review of the literature, we will reconsider tattooing from an epidemiological aspect, challenge current beliefs and explore new insights into the motivations and fears of tattoo artists and their clients.

2

COMPLICATIONS OF TATTOOS WE SEE AND THOSE WE FEAR: FOCUSED VS SEAMLESS PREVENTION

Jørgen Serup[1]

[1]*Department of Dermatology, Bispebjerg University Hospital, the Tattoo Clinic; (Copenhagen, Denmark)*

Background: The primary target of prevention of tattoo complications is to reduce clinically significant adverse events manifested as disease, complaints or psycho-social restraints. The secondary target is to eliminate or reduce clinically insignificants risk, being reported or not. Ultimately, any instrument of prevention must be sound, reliable, applicable and cost-efficient.

Aim: Description of the spectrum of tattoo complications and other problems associated with tattoos, which are first line targets of prevention, with analysis of importance, rationales and the available instruments of prevention. Description of second line targets of prevention assessed similarly.

Methods: Clinical data from a large sample of patients of the Bispebjerg Hospital Tattoo Clinic and the medical literature is briefly reviewed and discussed relative to preventive strategies. Strategies may be focused or integrated. An integrated concept labelled "*Seamless Prevention*" is introduced. Time wise the tattooed makes a move, *i* curiosity, *ii* being tattooed, *iii* finally satisfied, regret or complication. The *customer-tattooist interaction* is pivotal and most important to modify. The supporting industry making needles, inks and machines deliver requisites and needs guidance and control. Integrated prevention also includes a number of obligations and actions of health authorities. Focused interventions provided as "stand alone" has little chance to become efficient unless they are rational and acceptable.

Results: The presentation will propose a combination of preventive actions fitting into a seamless strategy. Instruments such as informed consent, safe tattoo practices with control systems, registration of activities and adverse events and the need for medical support and Authority´s surveillance with track record of hazards is discussed. Such pragmatic strategy is classical in medicine and public health and not critically dependent on precise knowledge. Control of tattoo ink stock products, brands and manufacturers is part of the strategy.

Conclusions: *"Seamless prevention"* is an integrated strategy building on a multi instrumental and balanced approach to prevention of complications of tattooing while targeting realistic and achievable aims. To influence the *customer-tattooist interaction* is pivotal.

3

STATE OF ART OF BASIC SCIENCE AND TATTOOS AS A PREREQUISITE TO REGULATION

Wolfgang Bäumler[1]

[1]*Department of Dermatology, University of Regensburg; (Regensburg, Germany)*

Various tattoo colorants are sold to tattooists and the colorants mainly consist of the colouring compound such as carbon black, titanium dioxide, or azo pigments. Such colorants usually originate from industrial pigments which are frequently not intended for human use. Therefore, the purity of such colorants is frequently on a technical level and hence the concentration of admixtures and impurities is frequently 10 % and more. Impurities in the colorants consist of substances like the remaining educts of the pigments synthesis. Admixtures are typically solvents, preservatives and other auxiliary materials. From a technical point of view it would be feasible to produce highly pure pigments by using various steps of purification, however, at great expense. In addition, the pigment used should include no toxic or carcinogenic potential as an intact molecule and when decomposed by enzymatic processes or radiation impact (ultraviolet, laser).

To regulate tattoo colorants, a first and pragmatic approach is application of a so-called negative list. Such a list should contain the known substances which are forbidden to be used in cosmetics or medical drugs because of its known toxic or carcinogenic potentials. Tattoo colorants should be labelled according to this list claiming that none of these banned substances are in such a colorant. The tattoo colorants should be periodically checked that the ingredients comply with such regulations.

4

EU ACTIONS TO ENSURE THE SAFETY OF TATTOOS AND THE PROTECTION OF CONSUMERS

Ana Maria Blass Rico[1]

[1]*The European Commission; (Brussels, Belgium)*

In the EU, only safe products are allowed on the market[1]. In the case of tattoo inks this requirement is the responsibility of the producers but also of the artist who offers tattoo inks to the public in the course of the tattooing service.

Market surveillance authorities of Member States have taken action (e.g. withdrawal from the market, import rejection) against tattoo inks that pose serious risks to the health and safety of consumers and notified them to the European Commission through the Rapid Alert System for non-food dangerous products (RAPEX)[2]. The Council of Europe Resolution (ResAp 2008)1 is the benchmark used in the absence of EU specific rules. As the ResAp (2008)1 is not legally binding, some Member States have adopted national measures based on it. The approaches adopted by Member States to deal with the same risk differ and this potentially could result in internal market problems. Furthermore, consumers are not enjoying the same level of protection in the whole EU. With the aim of comprehensively addressing all safety issues related to tattoos and their removal, the European Commission has launched an 18-months project with the participation of consumer safety experts, scientists, consumer associations, tattoo inks producers and tattoo artists. The project should provide and compare possible options and suggest elements to be addressed by future EU action on tattoo safety.

1 General Product Service Safety Directive: Directive 2001/95/EC of the European Parliament and of Council, 3 December 2001, general product safety. Official Journal L 11, 15.1.2002, 4

2 RAPEX: The Rapid Alert System for non-food dangerous products managed by the European Commission. http://ec.europa.eu/rapex

5

THE COMING EU/CEN STANDARD FOR TATTOO HYGIENE IN EUROPE

Andreas Schmidt[1], **Thijs Veenstra**[2]

[1]*Deutsche Organisierte Tätowierer (DOT); (Siegen, Germany)*
[2]*National Institute for Public Health and the Environment; (Amsterdam, The Net*her*lands)*

In the current situation, different guidelines for safe practise apply in different European countries. These guidelines are created by governmental and health organisations or by tattoo artists organisations. Some countries do not have national guidelines at all.

Tattoo artist often operate across borders. Having to adopt to different instructions in different national guidelines however does not contribute to compliance. It is therefore that the German tattooist organisation Deutsche organisierte Tätowierer (D.O.T) started an initiative to create one uniform European guideline for safe tattooing practice.

In 2014, the European Committee for Standardization (C.E.N) has established a European committee for tattooing services. The scope of the committee is standardization of requirements and recommendations for the provision of tattooing services. The final scope is to create a guideline for safe practice of tattoo artists, professionals that apply permanent make-up and every other professional who aims to insert any pigment or dye in human skin.

In every participating country, different stakeholders have interest in the process and the product. These include organizations of tattoo artists as well as representatives of beautician organizations, but also governmental organizations, public health- and medical professionals and manufacturers of products. All are represented via national standardization boards. Current plan is to reach consensus in 2016.

6

SURVEILLANCE OF ADVERSE TATTOO EVENTS

Cécile Verdier[1]

[1]*ANSM; (Saint-Denis Cedex, France*

Aim: Surveillance of adverse tattoo events

Method: A resolution of the Council of Europe in 2008 has helped to define requirements and criteria for the safety of tattoos and permanent make-up in order to increase the level of consumer health protection for these products.

Nonetheless, vigilance of these products is not specifically addressed by the Resolution. To date some systems for monitoring adverse effect with tattoo products exist:

Results / Discussion: At European level, when a serious risk to the health consumers associated with tattoo products is identified, the European Rapex system enables Member States to communicate between each other and with European commission.

At national level in France, the Agency for Medicines and Health Products Safety has created a specific vigilance system related to the adverse effects of tattoos. This vigilance includes reporting of all adverse events (undesirable effect and serious undesirable effect) through a specific notification form. Then an investigation is required by the competent authority, which may lead to corrective actions. Many actors take part to the system: the responsible person, the health professional, the person making tattoos and the consumer. Manufacturers are notably required to report all undesirable effects to the General Directorate for Competition Policy, Consumer Affairs and Fraud Control.

Conclusion: In Rapex system, problems identified with tattoo products concern the presence of heavy metal or aromatic amines. In French tattoo vigilance system, clinical adverse effects appeared with tattoos are identified and the controls realized on tattoo inks concern the sterility, the detection of heavy metals and aromatic amines.

7

TATTOO INKS, CHEMICAL ANALYSIS AND PIGMENTS RELATIVE TO REGULATORY REQUIREMENTS

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Aim: The protection of the health of the consumer must be the goal of all analytics, laws or recommendations for tattoo and permanent make-up (PMU) inks.

Method: Chemical Analysis.

Results / Discussion: Achieving this goal requires a detailed understanding of the analytical tests to be performed as well as of the use and most importantly frequency of use of the products, including the amount of ink in the skin. This amount has been determined by CTL® and is low even for a large size tattoo. The focus of analytical tests must be on consumer protection, which is not always the case and evident in several Rapex alerts from 2014 where due to unsuitable analytical methods several products were banned although there was no evident health risk for the consumer.

The Council of Europe Resolution, ResAP(2008)1 lacks detail in several parts. Most important are the missing analytical methods for the denoted limits. If limits are set without being linked to analytical methods they are meaningless. Results are highly dependent on the methods used. Furthermore, the reasoning for the set limits is unclear. In some parts they are similar to limits for food, cosmetics or drinking water, i.e. for products consumed or used on a daily basis.

However, ResAP(2008)1 does not take into consideration that a tattoo is often done only once in a lifetime, that pigments and metals are mainly insoluble and require appropriate analysis and that contaminant levels in large tattoos are lower than in an apple.

Conclusion: More detailed work required in all fields.

8

WHAT CAN REALISTICALLY BE IMPLEMENTED AND FOLLOWED: THE GERMAN PERSPECTIVE

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A regulation of tattoo inks is enforced in Germany since May 1, 2009. Based on the principles of resolution ResAP(2008)1 of the Council of Europe, the document provides negative lists of substances that are prohibited in tattoo inks, e.g., aromatic amines and pigments with known carcinogenic, mutagenic, reprotoxic or sensitizing properties. Furthermore, restrictions of the European Regulation 1223/2009 on cosmetic products are adopted. In comparison to the criteria laid down in ResAP(2008)1, the German regulation is not specifying maximum concentrations of PAHs and certain elements. Implementation of the document is followed by the federal surveillance program, which has reported deficiencies like incorrect labelling, use of forbidden pigments or excessive concentrations of preservatives on a regular basis. Taking into account the rising number of tattoo studios countrywide, more resources are urgently required to follow up on implementation of the existing legal requirements. Furthermore, it seems appropriate to consider proven adverse effects to a certain substance for a continuous amendment of the existing negative lists. Tattooing is a phenomenon with lifelong relevance for an increasing number of people, especially young adults. It is therefore important to systematically collect and evaluate data on health effects in close cooperation between physicians, surveillance agencies and risk assessors. With regard to the traceability of potential health effects as well as an important prerequisite for the choice of appropriate methods for tattoo removal, the customer should be informed in advance of the treatment by the responsible tattoo artist on the inks to be applied and their ingredients. Apart from such a step-by-step improvement of the existing regulation and its follow-up, further research, especially on biokinetics and chronic effects is urgently required as a basis for the reliable risk assessment of tattoo inks and the establishment of positive lists. Due to the legal consideration of tattooing as a procedure for beautification which does not justify animal testing, use of human data and *in vitro* methods needs to be taken forward wherever possible for generation of the missing data.

9

WHAT CAN REALISTICALLY BE IMPLEMENTED AND FOLLOWED: THE ITALIAN EXPERIENCE

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We observe a steady growth in the practice of tattooing in Italy, based on the first results of an ongoing survey. This trend is confirmed by the increase in the number of tattoo parlors; almost + 70% in three years (2012-2014).

Although tattooing and PMU are not covered by a specific national law, Italy has a regulatory framework that guarantees consumer protection. In Italy, ResAP (2008)1, although not mandatory, was made binding by Decree no. 206/2005 and is applied uniformly throughout the country. Not all the Italian regions adopted the Ministry of Health "Guidelines for the implementation of procedures for tattooing in safe conditions", creating a highly fragmented situation.

The Italian surveillance system appears to be working well and non-compliant and potentially unsafe inks are readily discovered and banned. In addition to the central Authorities' surveillance at the national level, surveillance is carried out at the local level by Local Health Units. The latter, by adopting an annual plan of surveillance, inspect tattoo parlors and monitor the ink trade/production, especially regarding the containment of microbiological and chemical risks.

Consistent criteria for the definition of a uniform professional profile for tattooists, a register of professional tattooists and systematic monitoring of tattoo parlors can significantly reduce the number of illegal tattooists and therefore reduce health risks due to incorrect practices. This, along with a register of ink manufacturers, good market surveillance focused also on preventing counterfeiting, and information campaigns on risk awareness would help to ensure the safety of consumers.

10

FROM ANCIENT TATTOOS TO TATTOOING OF TODAY

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Purposeful tattooing, defined as the practice of producing a permanent indelible mark on the human body by inserting pigment under the skin using a sharp object, has probably been around since the beginning of humanity. The oldest known European mummy with tattoos dates back about 5,300 years. Similarly, tattooed mummies have been found in Siberia, Peru, Chile and Japan. Tattoos were probably used for decorative, affiliative and religious purposes as well as for therapeutic purposes. However, tattooing was prohibited in the Bible and little is known about tattooing, and was probably rare, in Christian lands during the first 1500 years A.D. The British Explorer, Captain Cook and his crew, were fascinated by the skin markings they found on the people of the South Pacific and the sailors brought back these ideas on their return to the West. Tattooed people were used for shows; tattoo shops were opened. In 1891 the electric tattoo machine was developed. Between the two world wars, tattoos became mainstream among military and working class men. Later they were used for identification purposes, usually as a sign of affiliation with a particular group or gang. In recent years, as techniques have become easier and more sophisticated, tattooing has become fashionable and increasingly common, with a prevalence of almost 40% among 26-40 year olds in the United States. Medical and cosmetic uses continue to proliferate.

11

FOREIGN BODIES, PIGMENTS & CONTAGION: THE 19TH CENTURY EUROPEAN TATTOO AND RISKS TO HEALTH

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The late nineteenth-century saw a surge in the popularity of tattooing across Europe, coinciding with the development of new tattooing technology in the form of the electric tattoo machine, the emergence of a professionalised industry, and a renewed scholarly interest in the practice within the fields of medicine and criminology.

During this period, medical professionals took particular interest in the health risks associated with tattooing. Having been thought to possess therapeutic properties across diverse cultures throughout history, the tattoo now came under attack by medical science as a potential agent for the transmission of highly contagious diseases such as syphilis and tuberculosis.

This paper explores this historical moment in the development of European tattooing from folk practice to professionalised industry, combining an examination of the historical medical literature with an analysis of extant collections of preserved tattoos held in European medical museums. The practice of preparing and collecting tattoos was closely related to the scientific interest in tattooing during the nineteenth and early twentieth centuries. Tattoos played a significant role in medico-legal research across a wide range of disciplines, notably dermatology, forensic medicine, psychiatry and anthropology.

From the criminological perspective, the tattoo as a surface signifier represented a kind of peculiar 'social symptom' of underlying psychological malaise, which could be read and diagnosed from the formal aspects of the tattoo marks themselves, in a similar way that the surface eruptions of skin disorders may be read as a sign of internal disease. Paralleling the criminal-anthropological study of tattoos, late nineteenth- and early twentieth century physicians responded to the tattoo variously as foreign body, toxicity risk factor, and vector of disease.

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EPIDEMIOLOGY OF TATTOOS

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Tattooing has played a part in many cultures throughout history and is closely related to practices carried out in many ancient tribes. Today, its ritual meaning has partly vanished and tattooing has become a part of lifestyle in developed countries. A recent German study found a tattoo prevalence of 9% in the general population. Prevalence for under 25 year olds was found to be 14%. The highest prevalence of tattoos was seen among 25-34 year olds (22.3%). A previous study, conducted in Germany in 2005, showed 22% of males aged 14-24 with tattoos. Studies conducted in other countries showed similar figures. Even among Canadian High School children (aged 12 – 18), 8% reported having tattoos.

The recently published German study found there to be no statistically significant association between level of education and tattoos. However, one American study showed opposing results, reporting correlations between lower education, imprisonment and tattoos.

Despite available literature on the prevalence of tattooing, this seems not to be the most suitable approach. Since the rate of new tattoos in a population usually exceeds the rate of removal (due to death or laser treatment), prevalence will necessarily increase over time. One study in the United States reported a prevalence of 25% among 18-50 year olds, which seems to be partly due to this accumulation effect. The more effective approach in order to measure societal trends towards tattoos seems to be analysing incidences.

Using the appropriate measures of tattoo occurrence is only one of many challenges in tattoo research.

13

TATTOOING, FUTURE DEVELOPMENT AND TRENDS WITH A REVIEW OF THE PRE-CONGRESS SEMINAR

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Tattooing is an ancient procedure that nowadays is increasingly a subject to regulations on the part of authorities. The pre-congress will focus on the current state of tattooing in Europe compiling epidemiologic data and the business of tattooing. This should include complications of tattoos, state of art of basic science as a prerequisite to regulation.

It is important that regulations will cover the EU nations to ensure the safety of tattoos and the protection of consumers along with the coming EU/CEN standard for tattoo hygiene in Europe. Adverse reactions to tattoos are frequently reported in the medical literature. Thus, surveillance of adverse tattoo events would be an important step to quantify the risks of tattooing.

The future outcome of such surveillance should be correlated to the knowledge about tattoo colorants and its ingredients proven by chemical analysis. All the information should be wrapped up to support regulatory requirements on national basis and EU-wide.

14

CAN A PERSON WITH KNOWN NICKEL ALLERGY BECOME TATTOOED?

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Introduction: Nickel allergy affects 9% of adults (females 17%, males 3%). Everybody who is allergic to nickel may develop dermatitis by skin exposure to very low amounts of nickel. Many tattoo inks contain nickel. Is it safe for nickel allergic persons to become tattooed?

Methods: Sources of information: reported concentrations of nickel in broad selections of tattoo inks in Denmark, Italy and Sweden; clinical reports; knowledge on levels of nickel resulting in allergic contact dermatitis; restrictions and recommendations for prevention.

Results: Nickel was detected in all tattoo inks from Denmark (n=61) and Italy (n=56). The highest concentrations were 18 µg/g (=ppm) (Denmark), 9.6 µg/g (Italy) and 71 µg/g (Sweden). No conclusive relationship between concentration, brand, colour or pigment has been revealed. The sources of nickel are unknown. The levels in many tattoo inks result in exposure exceeding the limit values in REACH (release 0.5 and 0.2 µg/cm2/week) and the recommendation for consumer products (1 µg/g).

Conclusion: It cannot be regarded safe for nickel allergic persons to become tattooed today, when most tattoo inks contain nickel. No information on nickel concentration in tattoo inks is available to tattooists, clients or retailers. No recommendation on how to avoid nickel-containing tattoo inks can be given. The current requirements by the Council of Europe in ResAP(2008)1, which is applied in some European countries, states that nickel shall be “as low as technically possible”. This is insufficient for protection of public health.

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PHOTOCARCINOGENICITY AND BLACK TATTOOS, SCREEN EFFECT OF BLACK PIGMENT AND DELAY OF SKIN CANCER DEVELOPMENT

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Aim: The purpose of this study is to investigate synergistic tumour induction effect of the combination of ultraviolet radiation (UVR) and a chemical carcinogen. Photocarcinogenesis involves substances that are carcinogenic in combination with UVR. The black tattoo used contains high amounts of the known carcinogen, benzo(a)pyren (BaP).

Methods: Immunocompetent mice were tattooed on their back with a black ink* which has a high content of BaP. Half of the mice were irradiated with three standard erythema doses UVR three times weekly. Time to induction of first, second and third squamous cell carcinoma (SCC) was measured. Controls were tattooed without ink. The colour of the tattooed skin was measured by CIELAB L.

Results: All irradiated mice developed SCCs while no malignant tumours were seen in the non-irradiated group. In the tattooed and irradiated group the development of SCCs was significantly *delayed* compaired with the controls not tattoo and irradiated. The median delay until onset of first, second and third SCC was 49 days, 49 days, 56 days respectively in the two groups ($p<0.001$), see table.

	Group no.	Number of mice (n)	Treatment	Development of tumours
Chemical carcinogenesis	1	25	+ tattoo + UVR	NO
	2	25	+ tattoo + UVR	NO
Photo-carcinogenesis	3	25	+ tattoo + UVR	YES
	4	24	+ tattoo + UVR	YES *

*Significantly delayed compared with group 3.

Conclusions: Non-irradiated mice with black tattoos manifested *no* observed skin cancer despite the fact that the ink was rich in BaP. Surprisingly we found UVR cancer induction to be significantly *delayed* in black tattooed mice versus mice surrogate "tattooed" without ink. Black tattoos were clearly protective against the development of UVR-induced skin cancer in mice. Black tattoo pigment in the dermis reduces backscatter of UVR which may explain the study outcome, supported by colorimetric measurement.

*black ink used: "Tribal Black"

16

THE DANISH EPA RISK ASSESSMENT OF TATTOO INKS

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The Danish EPA is in favour of a stand-alone regulation on tattoo inks in the EU, where the legislation is based on the principle of risk minimization.

A major concern is the identified content of carcinogenic degradation products from azo-colors (including aniline), PAHs (impurities) and lead in tattoo inks. In order to reflect the current level of safety for consumers in other areas such as PAHs in consumer goods and azo-colours in textiles, these substances should be restricted.

A second concern is to restrict the use of CMR cat 1 constituents in tattoo inks in the same manner as has been done in Annex XVII with other consumer products.

The development of a risk assessment as normally produced in the relation to chemicals under REACH is not considered relevant as the risk assessment for tattoo inks is complicated. A major constraint is the exposure estimation. It is evident that at least the pigments in the inks are absorbed, since the lymph nodes are colored with the same colors as adjacent tattoos. However, the assessment of the exposure is rather different from the 'normal' exposure routes on which risk assessments are based since the skin barrier is penetrated and the inks are placed under the skin (long-term exposure through initially damaged skin). Thus, the models normally applied in risk assessments would not be applicable in the case of tattoo inks.

However, in order to establish limit values to enable regulation calculations have been performed and will be presented at the conference.

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PREDICTIVE VALUE OF RISK ASSESSMENT INDICES: RISK THAT RISK ASSESSMENT IS MISLEADING

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Background: Classical toxicology provides mathematical models and methods for risk prediction of pure chemicals out of *in vitro* register data and animal study. It is tempting to apply such methods to tattoo ink products.

Aim: To revisit the potential use of toxicological risk assessment models for risk prediction of tattoo inks products relative to key clinical end points in particular the known risk of allergy and the potential risk of cancer. It is an assumption in the ResAp(2008)1 that ban of certain ingredients and limitation of others truly eliminates risks or reduce the incidence of adverse events in the real world scenario making intervention meaningful.

Methods: Register data on toxicity of tattoo ink pigments and ingredients is held against clinical end points using common concepts for estimation of predictive value of laboratory tests, i.e. their applicability, sensitivity and specificity.

Results: *Tattoo and allergy*: Allergy of red tattoos related to azo-chemicals is a significant clinical problem. The allergen is formed as a hapten in the skin and only partly originates from some unknown raw material in the ink with primary aromatic amines (PAAs) being hypothesized to play a role. Prediction of risk of allergy from analysis of specific PAAs in inks and estimation of acceptable threshold concentrations is invalid since an exposure-event relationship cannot be established due to the lack of fundamental knowledge on chemical(s) and causality relative to allergic manifestation in tattooed persons.

Tattoo and cancer: Poly-aromatic hydrocarbons (PAHs) are associated with airway cancer and potentially with CMT-events in human use. PAHs account many chemicals found in the same carbon black. PAHs were present in tattoo inks for a century or more and also present in tars extensively used in dermatological therapy. However, review of the medical literature and long term follow up studies on cutaneous neoplasia related to black tattoos and tars on skin could not verify PAH exposure of skin as carcinogenic in this organ, neither in regional lymph nodes. Sunlight is a powerful skin oncogene. A recent mice study indicated light absorption in black tattoo pigment reduces the risk of skin cancer, hence black tattoos even may prevent skin cancer.

Conclusions: Risk prediction of tattooing from chemical analysis of PAHs and PAAs in tattoo ink products as suggested in the ResAp(2008)1 remains highly controversial, not validated and from present state of knowledge unlikely to be an accurate determinant of tattoo risk in humans.

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MANUFACTURING OF SAFER TATTOO INKS IN THE FUTURE: THE EUROPEAN AMBITION

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Aim: Demonstrate how inks can be manufactured safe.

Methods: presentation of the manufacturing process of one specific ink, including raw material management, testing and documentation. Proof of microbiological stability and comparison of efficacy of different preserving systems.

Results: Inks are free of toxic forbidden ingredients and will remain microbiological safe for use in opened bottles (comparison of different preserving systems).

Conclusion: Tattoo inks can be manufactured save and according to ResAP(2008)1.
Well formulated inks with effective preserving system do not afford single-use packaging.

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CHEMICAL ANALYSIS OF INKS ACCORDING TO EUROPEAN COUNCIL RES AP(2008)1: ARE TESTS ACCURATE AND RELEVANT?

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Introduction: The EC Resolution ResAP(2008)1 is the basis for most national legislations on tattoo inks. Legal limits are proposed for contaminants (heavy metals or polyaromatic hydrocarbons (PAH)). Further on, tattoo inks must not contain or release listed primary aromatic amines (PAA).

Discussion: The requirements for PAA are unsatisfactory: First, impurities (PAA) are mingled with ingredients (pigments that may release PAA). Besides a differing hazard scenario, high single doses vs. potential low level chronic contamination, information on both substance classes cannot be gained with one analytical method. Furthermore, neither kind of release (enzymatic, photo degradation by sunlight or laser) nor limits are specified, which renders it impossible to develop analytical methods. Both methods described in the resolution take advantage of the textile norm EN 14362 for the determination of sweat soluble dyes. As cleaving conditions were adopted in the Swiss but were altered for tattoo inks in the Dutch method, results from both methods are comparable but not the same. Irrespective of these differences, both methods suffer from the impossibility to adequately dissolve pigments and therefore fail to detect some problematic pigments and give rise to high measurement variances for the others.

Conclusion: Taking into account the different pathways for the release of PAA from pigments, it would be best to ban pigments that release PAA and analyse pigments not PAA.

Further on, limits, not methods, should be fixed for free PAA and nitrosamines while for PAH and heavy metals consensus methods linked to legal limits are needed.

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PERSISTENCE AND SURVIVAL OF BACTERIAL STRAINS IN STERILIZED TATTOO INKS

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Aim: Verify the microbiological characteristics of sealed tattoo inks and the potential capability of some microorganisms species to survive in them.

Method: Sealed tattoo inks were microbiologically tested. Inks were taken under sterile conditions and cultured for the following parameters: Heterotrophs; moulds; anaerobic bacteria; non-tuberculous mycobacteria; *Staphylococcus aureus*; *Pseudomonas aeruginosa; Candida albicans;* Gram negative bacteria. Strains isolated were identified by biochemical tests.

Additionally, the survival rate of selected bacterial strains, *S. aureus* and *P. aeruginosa*, in sterile tattoo inks, was monitored. Bacteria were inoculated in undiluted and diluted inks.

Results / Discussion: Despite claims of sterility (β ray) on the label, 10 out of 26 sealed inks were contaminated. *Alicyclobacillus acidocaldarius/acidoterrestris, Kocuria varians, Bacillus cereus,* several species of *Staphylococcus (S. auricularis, S. hominis hominis, S. warneri, S. lugdunensis),* anaerobic bacteria, and *Penicillum* were isolated. It was observed that the inoculated strains of *S. aureus* and *P. aeruginosa* were not able to survive in undiluted inks for more than 24 hours. Nevertheless the two strains had different behavior: *S. aureus* concentration even decreased after ink dilution, while *P. aeruginosa* oddly enough survived in high concentration at 10^{-2} dilution for the whole observation period (45 days).

Conclusion: β radiation technology seems to have a low capability to inactivate all the microorganisms in tattoo inks. On the other hand, the inability of tested bacteria to survive in undiluted ink confirms this matrix as a very hostile environment. Nevertheless, the ability of *P. aeruginosa* of growing in diluted stored inks makes these products potential vehicles of infection at least for this microorganism.

22

METHODS FOR STERILISATION OF TATTOO INKS: EFFICIENCY AND PRODUCT INTERACTION

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During Tattooing pigments are put into the dermis with needles puncturing the epidermis. This causes multiple wounds which are portal of entry for various pathogens which can lead to a wound infection. This led to the wish and demand for safe tattoo inks.

An often cited demand is the use of one way packaging or mono dose. But is the wish for this Monodose really the jack of all trades (eierlegende Wollmilchsau)?

Are there other means and ways to create safe tattooinks?

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TATTOOING, WHAT'S GOOD AND WHAT'S BAD

Liz Kierstein [1]

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What's in a name? How do common and academic people understand the concept and expression "professional tattoo"? Prejudices and media information do not necessarily cover the real understanding of professional tattoos. Tattooing as an art is performed by educated artists often with different artistic backgrounds and personal expression. This lecture will show you the various stages and qualities of tattoos in the skin and take you on a trip down "Tattoo Lane".

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THE AFTERCARE JUNGLE

Mel Dredd[1]

[1]*Ink By Mel; (Denmark/Australia)*

Aim: An overview of the aftercare treatment for tattoos and their impact of the healing process, as well as their potential complications.

This presentation will focus on trying to disentangle the various available methods of aftercare for tattoos, as well as formulating a base for a unified advice offered to clients by tattooists on which methods are best advised to take care of their healing tattoo. In trying to understand the impact of proper aftercare on the speed and quality of the healing, we'll also try to determine if poor aftercare has a negative impact on the health of the client, leading them to consult a physician, thus confusing the results of previous studies made on tattoo risks . Also, we'll be trying to determine if the infection rate is higher in clients with poor aftercare habits compared to clients with good aftercare habits in the context of professional studio tattooing.

Methods: Based on the results of an online survey of 50 (so far) tattoo clients, and numerous face to face discussions with tattoo artists and clients. The survey answers are analysed and compared to published studies on wound care to try and determine the aftercare impact.

Results: Trends are evident in the aftercare and are quite visible in the results.

Conclusion: From the surveys, we can conclude that an important part of the infections seem to be caused not by the tattoo process itself but by adverse events during the healing process. This is something that needs to be discussed and impressed on all clients and artists.

25

HOW TO AVOID PROBLEMS WITH PERMANENT COSMETICS

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Introduction: One of the reasons of the growth in amateurism is the education. International group classes are hype nowadays. Bad or poor reputation in the sector is also due to irresponsible attitude towards our clients. Basic principles such as consultation, consent form are rarely applied musts.

Discussion: Since permanent make up is not a recognized activity in Belgium one is free to choose education/classes. Whatever education one chooses, one chooses consequences as well.

Individual vs. group classes:

Both ways of teaching suffer from a non-existing recognized education. A recognized class in permanent make up is the first step to avoid problems with permanent cosmetics.

Basic principles like hygiene, consultation, risks, complications, consent form require proper attention and legal substation.

Own professional attitude becomes important nowadays. One needs to be conscious and realize that cosmetic procedures involve risks at all time.

Conclusion: Recognized classes are imposed. Know how to choose your educator. Taking into account the numerous offers of education, it would be advisable to check properly before choosing (checklist).

Once a professional know your competence and let the cobbler stick to his last.

26

TATTOOING AS AN ADJUNCTIVE TOOL FOR SURGICAL SCARS

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Dermatography is a tattooing technique used to camouflage pathologic skin conditions, for scar correction and as an adjunct to reconstructive surgery. A large variety of standard colors can be used and mixed until complete matching of the surrounding skin color is obtained. When the colors are applied in an open pattern the natural tanning process is preserved. In this application, the natural translucence of the underlying skin is also partially preserved and enhances the natural result. When required a complete covering of the underlying skin can also be obtained.

Correct information about the results and the risks and a procedure performed by a well trained professional can minimize complications and dissatisfaction.

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EXTENSION OF SURVEILLANCE ACTIVITIES IN ITALY: DETERMINATION OF POLYCYCLYC AROMATIC HYDROCARBONS IN TATTOO INKS CONTAINING CARBON BLACK

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Aim: A method for the determination of PAHs in tattoo and PMU inks was developed and validated to increase surveillance activities in Italy (until now, the surveillance activities have included the determination of carcinogenic aromatic amines and heavy metals).

Method: Carbon black pigment (Colour Index 77266) is often used as a main component in the production of dark inks. Carbon black, due to its physico-chemical properties, has a high adsorbent power and so it is able to adsorb – on its surface - various kinds of impurities.

Results / Discussion: *Resolution ResAP(2008)1 on requirements and criteria for the safety of tattoos and permanent make-up (superseding Resolution ResAP(2003)2 on tattoos and permanent make-up)*, defined maximum allowed concentrations of impurities in products for tattoos and Permanent Make-Up (PMU). The limits for PAHs are set at 0.5 ppm (mg/Kg) for total PAHs and at 5 ppb (µg/Kg) for BaP.

Conclusion: Polycyclic Aromatic Hydrocarbons (PAHs) are one of carbon black's common impurities: these wide group of molecules, composed of multiple aromatic rings, may be hazardous to health. Benzo[a]pyrene (BaP), one of the most famous PAHs, is classified by CLP Regulation (EC) No 1907/2006 as a carcinogenic compound." The analytical results of PAHs determination for about 20 black samples of various brands of tattoo and make-up inks are reported.

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THE KOREAN TATTOOIST SURVEY: A WEB-BASED SURVEY

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Aim: In Korea, only physicians are allowed to give tattoos. However, most decorative tattoos are performed by tattooists. We aimed to study the actual state of the tattoo practice in Korea.

Method: We performed an anonymous internet survey in Korea. The participants were the members of Korea Tattoo Artist Association (KTAA) and the Korea Tattoo Association (KTA).

Results / Discussion: A total of 1,004 tattooists participated, 527 completed the survey. The mean age of the tattooists were 31, including 426 men and 111 women. Out of the respondents, 476 respondents replied that they practice tattoo, and 375 (76.6%) tattooists were currently operating his/her own tattoo parlor. The other tattooists in practice performed tattoo free-lancer tattooists in a tattoo parlor or at home. The requisites for safe tattoo practice were the introduction of a tattooist license (33.9%), the formulation of safety regulations (27.2%), provision of sanitary training courses for tattooist (14.9%). The tattooing needle used in tattoo practice should be treated as health-care waste, however 47.7% of tattooists responded that needles were treated as general waste after use. We asked the complaints of customers including health problems, but most of tattooists replied that there were "no" complaints to be reported. Our results revealed that Korean tattooists are defensive about reporting customers' complaints and tattoo-related health problems.

Conclusion: The tattoo safety management regulations are required for minimizing adverse events including sanitary training for tattooist, adequate waste disposals procedures.

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HEALTH IN THE TATTOO INDUSTRY: AN OBSERVATIONAL STUDY OF 448 FRENCH TATTOOISTS

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Aims: The data regarding the health of professional tattooists are inexistent. Tattooists are usually heavily tattooed and exposed daily to body fluids and skin-to-skin contacts with customers, tattoo inks, solvents, allergens, irritants, and work for hours often in inadequate positions using a vibrating tattoo machines. We analyzed the health status of active French tattooists

Methods: An observational self-reported internet survey was performed among the tattooists of the French Tattoo Union in November 2013, with emphasis on the prevalence of tattoo related complications and of systemic diseases

Results: Of the 448 respondents, 42.6% reported a "tattoo reaction" on a least one of their prior tattoos: transient itch (45.7%), wax-and-waning swelling (57%), and swelling after sun exposure (23%). A tattoo "allergy" on one color of the tattoo was found in 8%. Permanent itch , swelling and cutaneous infection were rare. No skin cancer on tattoo was reported. The main physical complaints were musculoskeletal: back pain (65%), finger pain (41.5%) and muscular pain (28.8%). Finger pain, back pain, muscular pain and carpal tunnel symptoms/tingling sensations on the fingers occurred in 88% 61.5%, 68% and 84%, of the cases after having started their activity ($p < 0.001$) Autoimmune diseases, cancer and pregnancy complications remained at a low level here.

Conclusion: Professional tattooists have a high prevalence of minor complaints (transient itch and swelling) and photosensitivity on their tattoos like in the general tattooed population. They have also a high prevalence of musculoskeletal disorders including back pain and carpal tunnel syndrome implying preventive strategies.

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TATTOOING, LATEX AND LIFE-THREATENING ALLERGY

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Aim: To enlighten the risk of developing Type I and IV latex allergy among tattooed and tattooists.

Material

1. Case-story. Anaphylactic reaction: In 2003, a 40-year old, previously healthy male, acquired a black tattoo on his left shoulder. During tattooing, the skin was touched and rubbed numerous times by the tattooist wearing latex gloves. Subsequently, the customer experienced several allergic reactions with anaphylactic symptoms requiring hospital treatment at the intensive care unit. Swelling, papules and haemorrhagic blisters in patient's tattoo preceded anaphylactic episodes. It is plausible the patient was sensitized during tattooing.

2. Questionnaire to professional tattooists: 46 tattooists completed a questionnaire concerning problems related to usage of latex gloves.

Results: No tattooists had ever experienced anaphylaxis among their customers or colleagues. However, a customer with known latex allergy had warned his tattooist. Many tattooists reported customers experiencing nausea and fainting while undergoing tattooing, supposedly due to hunger, dehydration, nervousness, irregular breathing or fear of needles. None of the tattooists found it necessary to summon an ambulance.

Six of 46 tattooists (13%) had experienced hand dermatitis when using latex gloves and 2% were unsure whether problems were related to latex gloves. Problems mentioned were itching and redness. During the last 5-10 years many tattooists have substituted to either non-powdered latex or nitrile gloves.

Conclusion: Life-threatening anaphylaxis type I latex allergy can exceptionally be induced through tattooing and theoretically also afflict the tattooist. Type IV allergy to latex, manifested as hand eczema, is not uncommon among tattooists. Many tattooists have already replaced powdered latex gloves with non-powdered or nitrile gloves.

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DIAGNOSIS AND SPECTRUM OF CLINICAL COMPLICATIONS OF TATTOOING

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Background: Clinical complications of tattooing were reported centuries back and depend on the society and tattoo inks and techniques at any time. Complications in the medical literature were mainly individual cases, and a large recent material has not been published.

Aim: To describe the panorama of medical and other complications of tattoos as diagnosed in the Tattoo Clinic since 2008.

Methods: The clinic has access to histopathology, microbiology, allergy patch testing, 20 MHz ultrasound, laser therapy and surgery. The material presently includes over 500 manifestations in 370 patients. All reported cases were hospital cases.

Results: *Bacterial infections* dominated by staphylococcal infections and manifested as local, regional and systemic infections including cases of sepsis requiring intravenous therapy is a large group. The sources are the tattoo ink and the procedure. Viral infections included warts, herpes simplex and pericarditis. *Allergy in red tattoos,* mostly seen as plaque-elevation with a "lichenoid" appearance but also seen as deep ulceration or excessive hyperkeratosis is another large group. Lilac, green and blue tattoos also may develop allergy. Standard treatment offered is surgery with dermatome shaving for safe removal of the pigment in the dermis. Lasers are relatively contraindicated. Nickel and parabens in inks can produce severe eczema shortly after the tattoo is made. Urticarial reaction also may develop as may photosensitivity. A case of life threatening latex allergy was diagnosed. *Black tattoo reactions* explained by pigment agglomeration and foreign body formation thus non allergic was a large group offered dermatome shaving if topical corticoids failed. *Psycho-social complications*, i.e. gang members in exit programs is a significant group treated with lasers. The clinic cannot offer laser removal in case of regret. *Miscellaneous cases* include neurologic cases with invalidating pain, sarcoidosis, vasculitis, autoimmunity with ulceration and leg amputation. *Complications due to tattooing* and needle trauma such as scarring were seen. *Cases of skin cancer* and regional lymph node malignancy related to tattoo pigment were neither seen in the tattoo clinic nor in the skin oncology clinic of the department of dermatology. The vast majority of patients with complications had their tattoos made in professional parlors.

Conclusions: Tattoo complications are cumbersome, clinically distinct and referred to different disease mechanisms. The prominent complications are bacterial infections, allergy in red tattoos, pigment agglomeration in black tattoos and psycho-social problems. Complications include exceptional cases and can be life threatening or invalidate the sufferer. Complications are dependent on the tattoo and the tattooed person and his individual predisposition to develop some distinct complication.

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COMPLICATIONS OF ALLERGIC REACTIONS TO TEMPORARY TATTOOS

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Temporary henna tattoos are popular, even among young children. In contrast to the body pastes used by Hindus and Muslims, consisting solely of henna, they may illegally contain high concentrations (up to 30% or more!) of para-phenylenediamine (PPD) and derivatives to let the tattoo dry faster and make it darker and longer acting. However, the latter chemicals are strong sensitizers in hair dyes of the oxidative (permanent) type, responsible for allergic contact dermatitis in hairdressers and consumers (even though the maximum EU permissible concentration is 3 % when applied as a mixture).

An allergic reaction to a temporary tattoo usually presents as vesicular and even bullous eczema at the contact site, but also erythema-multiforme like and lichenoid reactions may occur. The dermatitis usually appears after 10 to 14 days following the application (when the color is fading), persists rather long, and may spread to other body parts. In previously sensitized subjects, the skin lesions may already occur after 1 to 3 days following the tattoo application.

Healing occurs frequently with post- inflammatory long-lasting hyper-pigmentation or depigmentation.

Para-phenylenediamine does cross react with many substances present in our environment, such as chemically related hair and textile dyes, local anesthetics of the ester type (e.g. benzocaine), sunscreens (p-aminobenzoic acid), and certain plastic and rubber compounds. The consequences of this illegal practice are serious and may even compromise the later career of the sensitized subject.

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WHAT CONTRA-INDICATES TATTOOING?

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Tattooing is getting increasingly popular among the young. However, not everyone is suited to getting tattooed. Indeed, it is not rare for patients with a chronic skin disease or another systemic condition to be eager to get a tattoo. They perceive tattooing as a harmless, risk-free procedure. Therefore, some patients may not seek medical advice before the procedure. Some also fear a judgmental approach by their physician, who may try to discourage them. Lastly, the tattooist does not have either the training or the education to properly advise a customer about his/her condition. Therefore, it is important that any physician be able to provide adequate counselling regarding the possibility of getting tattooed and under which conditions. Even though an exhaustive list is impossible to address, the main issues include chronic skin disorders, pigmented lesions of the skin, (congenital) heart disease, immunosuppressive diseases and treatments, blood clotting disorders, and pregnancy/breastfeeding.

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LEPROSY ON TATTOOS

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Aim: To study the leprosy patients with lesion/s starting after and over tattoo designs

Method: The leprosy patients attending Dermatology dept. of a large hospital, the district leprosy unit and villages camps in periphery between January 1984 to December 2014, were the subjects of this observational study. Those with leprosy lesions starting after and over tattoos were selected.

Results / Discussion: A total of 8739 leprosy patients (3219 females) were seen, the age varying between 16-72 years. Multibacillary leprosy was observed in 2617 (29.94%) and the rest had paucibacillary leprosy. Many of female patients (65 %) had single/multiple tattoo designs, commonly on the limbs. All had undergone unhygienic, shared needle tattooing 5 to 23 years earlier mostly at the roadside/weekly markets. Forty-nine females had developed leprosy lesion/s, starting over the tattoos. Detailed clinical, slit smear and histopathological examination was done. The reason for tattooing and procedure details if available, were noted. Forty three had paucibacillary leprosy, and single leprosy lesions were localized to single tattoo design in 29 cases. Efforts were made to dispel myths amongst the village women (who presume that tattoos make the post-earthly existence smoother) and also to educate tattoo artists of such risks and about preventive measures.

Conclusion: The onset of leprosy lesion after and at the site of tattoos, localization of single leprosy lesion to single tattoo design in many and histological confirmation, suggest the possibility of inoculation leprosy through unhygienic, shared needle tattooing, specially in highly endemic regions for leprosy.

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NEW FRONTIERS OF MEDICAL TATTOOS

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Dermopigmentation for medical purposes, or medical tattoo, is performed in order to re-establish bodily integrity in patients suffering from various diseases or who have undergone surgical intervention. In addition to the tattoos carried out for nipple-areola reconstruction, first used three decades ago, new applications for medical tattoos have been tested, showing great versatility.

There are many issues involved in this kind of tattooing as it deals with people who have often had serious illnesses and who still bear the physical and psychological signs. Moreover, many of these patients undergo drug treatments that can interact with their general state of health. Medical tattoo procedures require execution which must comply with conditions of hygiene and asepsis. They also require the use of suitable instruments, materials, specific inks, and great, professional qualifications and skills.

In Italy, we conducted a study on cases of medical tattoos, on how to perform them and on the training of tattooists. Currently, training is also offered by many manufacturers, carried out in 2 or 3 days, with the main purpose of selling their products, but it is completely inadequate. In fact, the tattooist must necessarily interact with a physician or a medical, multidisciplinary team. In addition, psychological consequences were even found among tattooists (e.g. burnout syndrome). Our study will show new applications for medical tattoos and will propose a professional profile and an operating protocol for such tattooing in safe conditions.

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LASER REMOVAL OF TATTOOS REVIEWED

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The widespread use of Q-switched lasers with high peak power and nanosecond pulse durations for tattoo removal began in the early 1990s. Nowadays, the same techniques are still used but there are some interesting new developments.

Q-Switched lasers for tattoo removal include the ruby laser (694 nm), alexandrite laser (755 nm) and Nd:YAG laser (1064/532 nm). The latter can be equipped with dye filters to emit 585/650 nm wavelengths. Recently, picosecond lasers also became available.

Tattoos are exogenous pigment particles that are mainly found intracellularly within fibroblasts and macrophages. Their size ranges from 2 nm to 400 nm (most commonly 40 nm), with smaller particles grouped into larger membrane-bound granules measuring 0.5-4.0 µm. Selective destruction of tattoo particles largely depends on two parameters: laser wavelength, which should match the maximum absorption by the target, and pulse duration, which is based on the target size. Ideal pulse durations are in the nanosecond and picosecond range. The absorption of laser energy leads to the destruction of pigment-containing cells through a photomechanical effect. Transepidermal elimination and lymphatic transport, as well as alteration of the optical properties of the ink, make the tattoo less apparent.

An average of 2-6 treatments is needed for amateur tattoos and 6-12 treatments for professional tattoos, but higher treatment numbers are not unusual. Complete ink removal is not always possible.

In this section, specific indications for laser therapy will be discussed (such as cosmetic, traumatic and medical tattoo's), as well as contra-indications.

Current research focuses on optimizing therapeutic results with combined modalities (different laser systems, lasers combined with topical drugs), different algorithms (such as the R20 method that involves 4 treatment passes with a 20 minute interval) and the development of more performant laser systems. These will be discussed in the next presentations.

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PICO-SECOND LASERS, NEW GENERATION INSTRUMENTS FOR TATTOO REMOVAL

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Aim: Tattoos have played an important role in human culture for thousands of years, and they remain popular today. The development of quality-switched (QS) lasers in the nanosecond (10-9) domain has revolutionized the removal of unwanted tattoos for 15 years. However, restrictions continue with this QS technology, such as resistant colours (blue, green yellow). Also, multiple sessions (10 to 15) are usually required.

Method: To describe the effect of a new generation of lasers, working in the picosecond (10^{-12}) domain entered the market in Europe one year ago. During this presentation personal examples with this technology will be presented in various tattoo conditions. This ultra short pulse duration breaks the tattoo pigment in much smaller particles, thus eliminating it more easily and quickly.

Results / Discussion: The use of picosecond laser results in a) less sessions needed, so less time required to clear tattoos b) better clearance of pigment c) possibility of removing previous resistant colours.

Conclusion: With this new picosecond technology a new era is opened in the field of laser tattoo removal, allowing better and faster pigment removal.

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TATTOO PIGMENT DECOMPOSITION – FROM PREDICTIVE PYROLYSIS TO LASER IRRADIATION

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Aim: In previous investigations, we characterized the decomposition patterns of several organic pigments including a wide range of toxic and carcinogenic compounds using pyrolysis-gas chromatography with mass spectrometric detection (Py-GC/MS). Similar decomposition patterns were published on UV and laser light irradiation for a few azo pigments. Such health concerns led to a switch from azo compounds towards non-azo pigments by some tattoo ink manufacturers although no studies have been reported on whether or not these would be indeed safer than their progenitors.

Method: Aqueous pigment dispersions of Blue 15:3, Red 254, Red 170, Yellow 138, Orange 13 and Violet 19 were irradiated with medical ruby (694 nm) and neodymium-doped yttrium aluminium garnet (Nd:YAG, 532 and 1064 nm) lasers and subsequently analyzed for decomposition products using GC/MS.

Results / Discussion: Decomposition products from laser irradiation correlate to those detected with Py-GC/MS. Cleavage of Blue 15:3, Red 254 and Yellow 138 resulted in the formation of different nitriles or imides with non-carcinogenic but irritating or toxic properties. Red 170 and Orange 13 were mainly cleaved at their azo- or amide bonds resulting in carcinogenic compounds which is consistent with previous studies. However, for pigment Violet 19 no cleavage products were detected under given laser irradiation parameters and it is therefore considered to be stable under these conditions.

Conclusion: The risk for decomposition of very lightfast pigments under laser irradiation has been underestimated in the past. Thus, also decomposition products of pigments with known and unknown toxicological properties should be considered for risk assessment of tattoo inks.

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NEW DEVELOPMENTS: FROM NANOSECONDS TO FEMTOSECONDS, FACTS AND FICTION

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An internet based survey revealed that most of tattoos are partially or complete black, followed by the use of red, blue, or green inks. As the incidence of tattooing continues to increase, so does the demand of people for tattoo removal. Due to various reasons, often aesthetic-, social- or employment-related, many tattooed individuals undergo a therapy of tattoo removal.

After tattooing into skin, the pigment particles are exclusively found intra-cytoplasmatically, lying in membrane-bound structures (heterolysosomes). To remove the tattoo colorant from skin, these pigment particles must be mobilized and pulverized at the same time. In order to destroy the particles selectively while minimizing the risk of side-effects to the skin, the use of short and intense lasers light pulses is applied so far. According to the principle of selective photothermolysis, the laser light must be absorbed in the pigment at a sufficient energy, and the pulse duration (e.g. nanoseconds) must be adapted to size of the pigment particle. Investigations of laser treated skin showed that the energy of the absorbed laser light is converted to heat. During ultra-short heating, the pigments will reach very high temperatures of several hundred degrees Celsius and may then, as proved by histology, lead to disruption of the pigment particle. The particle fragments are then removed via lymphatic or blood vessel system. Especially reduction in both pigment size and density clearly indicates tattoo colour fading that is expected by the patient and the therapist.

Unfortunately, the removal of the tattoo colour from skin frequently remains incomplete. In the past decades, laser light pulses with nanoseconds have been applied based on the assumptions of selective photothermolysis. For a short time, lasers with shorter pulse duration (picoseconds) are offered that might improve the therapeutic outcome.

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TATTOO INK TOXICOLOGY, THE KNOWN, THE UNKNOWN AND THE SCIENTIFIC CHALLENGE OF THE FUTURE

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Tattoo colorants contain water insoluble pigments that are inorganic or organic, coloured, white or black materials. In the past decades, tattooists used inorganic pigments that contained heavy metals such as mercury, chromium or cadmium. Two important inorganic pigments are still in use: carbon black for black tattoos and titanium dioxide (white).

Nowadays, the coloured tattoo colorants mainly consist of organic pigments like azo or polycyclic pigments, which are usually taken from the chemical industry. Although being injected in the human body, tattoo colorants usually fulfil no safety requirements comparable to other pharmaceutical substances. It is important to note that a fraction of the colorant stays in the dermis as particles causing the colour of the tattoo while an unknown fraction of the injected colorant is removed from the skin via lymphatic system staining lymph nodes at least.

Beside the colouring compound (black, red, green, blue, etc.), the colorants may contain various other substances depending on the methods by which the colorants are produced. Such colorants comprise educts, products, and by-products of the respective colouring compound, different solvents and even preservatives. The tattoo colorants may also contain various impurities that got accidentally into a colorant for unknown reasons. Thus, tattoo colorants usually exhibit a complex mixture of various chemical compounds.

At present, the list of identified admixtures and impurities in tattoo colorants is rather incomplete. Most of the tattoo colorants are manufactured for other intended uses and both, black and coloured tattoo inks may not have an established history for safe use in humans including the skin and human body. The ingredients of tattoo colorants should be analysed and controlled via negative list to avoid harmful substances.

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TATTOOS – FROM SKIN TO LYMPH NODES AND BEYOND?

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Tattoos are gaining social acceptance. The number of people with tattoos, the number of articles and documentations about tattoos in the media as well as the number of tattoo studios are increasing. However, the consequences of intradermal injection of tattoo ink are often neglected. The composition of tattoo inks is highly variable, and inks can contain many allergenic or carcinogenic components. Recent publications show loss of one third of the originally injected ink hours after application. Incidental findings of colored lymph nodes in biopsies demonstrate drainage of tattoo ink into lymphatic vessels and lymph nodes. Immunocompetent cells of the dermis and lymph nodes react with components of tattoo ink and granulomatous or delayed-type hypersensitivity reactions are possible consequences. Therefore, more research about the interaction between tattoo ink components and the human immune system has to be performed to finally set up a positive list of tattoo ink components of definable adverse effects.

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IDENTIFICATION OF TATTOO PIGMENTS IN BIOLOGICAL SAMPLES

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Tattooing exists already since the Neolithic period. In Europe and the US tattooing becomes more and more a popular mainstream accessory, comparable to piercings or jewellery. Astonishingly little is known about human health risks arising from long time effects of tattoos during pigment aging or about possible health risks of tattoo pigment fragments resulting from laser treatments used for tattoo removal. Valid data on the spatial distribution of tattoo pigments, their fragments resulting from laser removal within skin samples together with information about possible degradation metabolites occurring over time are key pre-requisites in a valid health-based risk assessment of tattooing. Imaging Mass Spectrometry (ToF-SIMS) was used in 2D and 3D mode to analyze, identify and visualize tattoo pigments and their laser treatment fragments in pig skin biopsy samples. ToF-SIMS is a technique where mass spectra can be acquired in a pixel like raster movement on a given surface thereby acquiring a mass spectrum for each pixel. Additionally using a layer-by-layer analysis technique ToF SIMS can be used to acquire 3D depth profiles of the analysed samples. ToF-SIMS combines high mass resolution with high spatial 2D resolution (< 100nm) and high depth resolution in 3D depth profiles (down to ca. 2.5nm). The results show for the first time the spatial distribution of tattoo colours and tattoo colour fragments resulting from laser treatment direct in biological samples on a sub-micrometer scale. Accumulation of specific tattoo colour fragments after laser treatment in “hot spot regions” of skin biopsies was observed.

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LIGHT INDUCED DECOMPOSITION OF INKS

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Introduction: Photodegradation is one of the reasons for tattoo fading and laser irradiation is the method of choice for tattoo removal. Both processes can release potentially toxic contaminants from the decomposition of the pigments and should therefore be taken into account in the evaluation of pigments for tattooing.

Methods: Tattoo inks were diluted with water and subjected to laser irradiation. Inks and pure pigments were placed between glass plates and subjected to artificial sunlight. After irradiation, samples were analysed with liquid chromatography coupled to mass and photo spectrometric detection.

Results/Discussion: Laser irradiation of inks containing the pigments C.I. 21095, 21108 and 21110 always lead to the formation of 3,3'-dichlorobenzidine. O-toluidine and 2,4,5-trichloroaniline were observed after laser irradiation of C.I. 12370 and aniline after laser irradiation of C.I. 21110 and C.I. 11767.

Artificial sunlight irradiation leads to similar degradation products. In addition, we found 3,3'-dichlorodiphenyl after irradiation of C.I. 21110 and C.I. 21095 and 3,3'-dimethoxydiphenyl after irradiation of C.I. 21160.

Several factors complicate the detection of degradation products like the instability of some degradation products under irradiation with artificial sunlight or the presence of high concentrations of impurities in the pigments. More information is needed about photodegradation processes of non-azo pigments to identify their decomposition products.

Conclusion: In vitro analytical screenings provide evidence that azo pigments are degraded to problematic contaminants by laser or sunlight irradiation. In the light of these findings, it is time to consider results from photodegradation studies to amend the negative list for pigments in tattoo inks.

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THE GERMAN, DUTCH AND BRITISH TATTOO HYGIENE GUIDELINES IN VIEW OF THE COMING EU/CEN STANDARD

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Hygiene is an inextricably linked to safe tattooing practice. The act of tattooing includes breaking the skin barrier, but is performed by professionals who are not medically trained. Infection control in tattoo practise continues to prove its importance as tattoo-related outbreaks of infectious diseases continue to be reported in Europe. Different guidelines for safe practise apply in different European countries. These guidelines are created by governmental and health organisations or by tattoo artists organisations.

Tattoo artist often operate across borders. Having to adopt to different instructions in different national guidelines however does not contribute to compliance. It is therefor desirable to have one uniform European guideline for safe tattooing practice.

In 2014, the European Committee for Standardization (C.E.N) established a European committee for tattooing services following an initiative of the German tattooist organisation Deutsche organisierte Tätowierer (D.O.T) . The scope of the committee is standardization of requirements and recommendations for the provision of tattooing services. This includes requirements on information to customers, i.e. informed consent, hygienic performance of tattooing, including knowledge and skills, infection control, vaccination, suitable facilities as well as requirements for cleaning, disinfection and sterilization, management of waste, necessary documentation and aftercare information. The process must lead to a European guideline that is understandable, practical and safe.

The committee has decided that the German, Dutch an British guidelines will be merged into one guideline that will serve as foundation for the European guideline. The content of these guidelines is similar but differ in the amount of detail and verifiability and in specific instructions. In 2015 consensus will be reached.

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WORKPLACE HYGIENE AND THE SWEDISH STANDARD, A MODEL FOR "GOOD TATTOO PRACTICE"

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Aim: Time has clearly indicated that the term good practice is relative. How tattooing is practiced is also very different thru out different cultures and within various populations. The way it's practiced in the modern world and with the increase of resistant bacteria's however demands a certain level of standard. Much has changed over the past decade, thus forcing the tattoo practitioner to learn more and take in consideration the many different hazards that comes with the trade. Sweden has been in the forefront of standard development over the last twenty years and has had a big success with practitioners working together with governmental issues to increase the safety for the end consumer as well as the practitioner.

Method: In the book "The road to becoming a tattoo artist" the Swedish tattoo association, has put useful information and studies for the artist and apprentice in writing, creating a standard of good practice. It is used by health inspectors as a standard and has been verified by booth dermatologists and doctors as an example for good practice.

Results / Discussion: By doing research and study we now have a working system for education and development of the standard we consider being a bare minimum for practice. Study's indicate strongly that tattooing must be practiced in a controlled environment and that the hazards increase by large nr when tattooing is done in a home environment.

Conclusion: A harmonized standard is at this point a minimum together with a regulation regarding education and practice.

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SURVEY OF STUDIES ON MICROBIAL CONTAMINATION OF MARKETED TATTOO INKS

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Tattooing has become a popular phenomenon during the late twentieth century. Because the act of tattooing involves repeated injection of ink through the skin, a risk of contracting infections from contaminated tattooing equipment, ink and surrounding environment exists. Progress has been made in infection control strategies; however, contraction of bacterial and viral infections by tattooing continues to occur. The risk of acquiring a tattoo-related infection largely depends on the hygiene conditions under which the tattoo is applied. Nevertheless, even when adequate hygiene and sanitation measures are taken, inks themselves may contain infectious microorganisms, able to survive under hostile conditions, such as inks. Results of the few studies on the microbiological quality of unopened and opened tattoo inks are reported. Some authors' conclusions put into evidence that the current ink sterilization systems show a low capability to inactivate microbial contamination in tattoo inks. At the moment the European Resolution (ResAP2008-1) recommends the ink to be sterile and supplied in containers which maintain the sterility of the product until application. In the light of the outcomes of published studies, at the moment the preservation of safe microbial quality of ink seems challenging and still difficult to reach.

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TATTOOING, LAW AND INSTITUTIONS: THE FRENCH CASE

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After years of observation and growing interest for tattoos, France has settled legal regulations for tattooing in 2008. 3 years before in 2005, tattooers gathered through a syndicate called SNAT, allowing them to speak with one voice with French authorities. Unlike many other countries, the law is the result of a common work between health boards and tattoo professionals, based on hygiene and disease control standards. This official text regulating tattooing in France gives the first legal existence to the profession

With the idea of finding the most accurate settlements, several workgroups took place at Health Minister Bureau through 2008, allowing tattooers and governmental Health specialists to meet and share common knowledge and experience, with the goal of finding balanced settings for legal security standards.

Based on a consensus between SNAT charts and public health board standards, the French regulation can be defined as being partly created by tattooers themselves.

The topic for ECTP is a description of what lead to this work in France and an explanation on how things work on a daily basis in the country for tattooers.

POSTER PRESENTATIONS

P1

DETERMINATION OF METALS IN TATTOO AND PERMANENT MAKE–UP INKS

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Aim: The aim of this paper is to put emphasis upon the influence of different methods of preparation of inks for determination of metals on the obtained results.

Method: Study included 17 tattoo and make-up ink samples, analysed on Pb, Cd, Ni, Cu, Zn, Sn, and Ba by flame atomic absorption spectrometry (FAAS), As by hydride generation AAS, and Hg by cold vapor AAS, following two methods of sample preparation: microwave oven decomposition with strong acids, and extraction with artificial perspiration solution (1 hour, 40°C) [1]

Results / Discussion: Analytical method including microwave preparation revealed presence of nickel in all ink samples, in concentration ranging from 1.2 to 48.2 mg/kg, while preparation by extraction resulted with no quantifiable quantities of nickel. Other analysed metals were not detected by any of applied methods./ For safety evaluation, laboratory uses microwave digestion, though this method does not take bioavailability into account. Legal limit for nickel content in inks is not established, but if safe allergological limit of 1 mg/kg is considered, all analysed samples might pose a risk for the development of dermatological reactions. In 35% of samples, nickel concentration was even above 5 mg/kg. However, based on extraction method, all samples would be considered as safe.

Conclusion: To avoid this ambiguity, it is necessary to agree upon appropriate analytical methods.

[1] Prior G. Tattoo inks. EpubliGmbH, Berlin

P2

TATTOO AND ADVERSE REACTIONS: A TERRIBLE GHOST

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Tattooing has been practiced for centuries in many cultures, and has become increasingly popular in Western countries since the 1970s, with a parallel increase in adverse reactions. It is well established that tattoos may be associated not only with different skin diseases, like transient acute inflammatory reactions at the site of needling, infective reaction, but also with serious medical complications such as allergic contact dermatitis, contact urticaria, photodermatitis and other dermatoses like psoriasis, Systemic Lupus Erythematosus (SLE), sarcoidosis or localisation of skin cancer (including basal cell carcinomas, squamous cell carcinomas, melanoma and keratoacanthoma) in the area of the tattoo. The reason for this occurrence has not been fully elucidated, but a locus minoris resistentiae or the isomorphism of Koebner has been hypothesised.

We present three interesting clinical case of cutaneous reaction to tattoo: a 41 years old patient with ketatoachantoma in red tattooing area; a 32 years old female with folliculitis and a 35 years old man with flat warts in red area of tattoo HIV related.

These clinical cases highlight the importance to performing the tattoo in a sterile environment and to perform an adequate screening for infective and immune-mediated disease.

P3

BELGIAN SUPERIOR HEALTH COUNCIL ADVISORY REPORT ON TATTOO AND PMU SAFETY

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Aim: The increasing popularity of tattoos and permanent make-up has raised the concern of the authorities over these techniques. A working group has been set up on this subject within the Belgian Superior Health Council. An advisory report aimed at limiting the risks of these procedures was elaborated.

Method: The report is based on literature search, conferences and expert opinion on the subject of tattooing and permanent make up.

Result: The board of the Belgian Superior Health Council approved the report that will be published in March 2015. It concerns a number of guidelines on hygiene, tattooing procedures, measures to guarantee safer products for the consumer, to improve the control system in Belgium as well as a proposal to implement uniform regulations on tattoo inks and body art procedures in Europe. A public awareness campaign will be launched in the near future.

Conclusion: The committee concludes that body art procedures, more in particular tattooing and PMU are not without health risks. The authorities have a responsibility to inform the public and to take measures to prevent the complications with harmonisation on a European level as the ultimate goal.

P4

INFLUENCING THE IMMUNE RESPONSE OF THE SKIN TO TATTOO PIGMENTS BY CONTROLLED LAYER BY LAYER ENCAPSULATION

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The Layer by Layer (LbL) technology allows the alternating deposition of polycations and polyanions (polyelectrolytes) in films of nanometer thickness on planar and colloidal surfaces.[1,2] Due to the large number of commercially available polycations and polyanions the surface properties of the coated materials can be widely varied and functionalized. In order to control the surface properties of tattoo pigments several typical inorganic and organic pigments were encapsulated with different polyelectrolyte compositions. The deposition of the polyelectrolytes changed and unified the surface properties of the different pigments like the surface charge (Zeta-potential) and the chemistry without remarkable changes of size or colour.

These surface properties play an important role by the recognition and bioclearance of the pigments by the immune system of the skin. In order to get more insight in possible processes in the skin we studied the interactions between human phagocytes and differently LbL coated microparticles. The obtained data allowed us to draw some conclusions concerning an optimal coating of dye pigments in order to achieve good biocompatibility and long term stability in the skin,

Furthermore we will show by means of some examples which other consequences the LbL encapsulation can have for the further improvement and application of tattoo pigments.

1) Gero Decher et.al. Langmuir 1991

2) Claire Peyratout et.al. Angew. Chem. Int. Ed. 2003

P5

SURVEY ON TATTOOING PRACTICE IN BELGIUM

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Aim: The increasing popularity of tattoos and permanent make-up has raised the concern of the Belgian authorities about these techniques. A committee has been set up on this subject within the Belgian Superior Health Council to realise an advisory report.

Method: In order to get an idea about the situation in Belgium, the committee organised a survey and invited all registered tattooist to take part in it. Of the 700 forms sent only 56 completed forms were returned.

Different aspects were addressed in the survey: training, hygiene and procedure, materials including inks, aftercare, documents including informed consent and registration of the inks used and complications.

Results of the survey are presented.

1. In general, hygienic measures are respected and sterile disposable needles are used
2. There is no standardisation of disinfection and aftercare. Every tattooist has his own "standard" method.
3. informed consent of the client is respected in 88% but registration of the products is only done in 60%
4. In 59% complications have been observed.

Comments: the tattooists expressed their concern about the "black-underground" tattoo activities; they asked for better training and information from the health authorities and the majority expressed good-will to cooperate to reduce complications.

Conclusion: the limited number of completed forms probably gives a false positive impression; we can presume that only the responsible professionals reacted. Education of the practitioners in cooperation with the sector can be improved.

P6

CUTANEOUS ALLERGIC REACTIONS TO RED DYE IN TATTOOS: REPORT OF THREE CASES

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Photographs were taken and published with permission of the patient.

Aim: To present three cases of cutaneous allergic reactions to red dye in a tattoo and to emphasise the different clinical and histologic presentations of allergic reactions to tattoos.

Methods: Case reports and review of the literature.

Results: Patient A, a 50-year old woman, developed a painful ulceration of a tattoo on the lateral right ankle. She also complained of a sudden onset of pain in a red tattoo placed on her left hip 30 years ago. The ulceration on the right ankle was restricted to the red dye (*figure 1*). Wound cultures revealed a pseudomonas aeruginosa infection. Histology showed chronic inflammation and fibrosis. Treatment consisted of compression bandaging, adequate wound care and analgesia.

Patient B, a 57-year old woman, complained of swelling since 5 months in the red part of a tattoo placed 8 weeks before. On physical examination swelling, erythema and squamae were observed (*figure 2*). Histopathological evaluation revealed a pseudolymphomatous reaction. The patient was treated with intralesional corticosteroids.

Patient C, a 23-year old woman, developed a chronic itch and swelling of the red part in a tattoo on her right lower leg, placed 2 months before (*figure 3*). Histology showed a chronic, partly granulomatous, inflammation. The patient was treated with topical corticosteroids.

Tattoos are a popular form of body art in The Netherlands. Over the past decades, changes have been made in the composition of coloured tattoo ink, which used to be composed of inorganic pigments containing heavy metals such as mercury or mercuric sulphide. Currently inks mainly contain azo or polycyclic pigments.

Conclusion: Clinical and pathological classification of tattoo reactions remains challenging because of the great variety in clinical appearance and histological patterns. In spite of changes to the compounds in tattoo inks, allergic reactions are still mostly observed to red ink.

NB: Figures are not included in the programme and abstract book but can be seen on the poster

P7

NEW CLINICAL CLASSIFICATION OF TATTOO REACTIONS

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Background: Tattoo reactions are divided into infectious and non-infectious complications. In the past the diagnosis relied on histopathology which, unfortunately, is not specific and distinctive regarding the mechanism of reactions. These reactions are allergic, urticarial, foreign body induced manifestations etc. The pathomechanism rather than the histologic pattern determines the choice of therapy.

Aim: To introduce a new and simple clinical diagnose classification scheme of tattoo reactions. The classification is to be applied by dermatologists and general practitioners in their diagnostic process.

Methods: The classification is based on extensive clinical experience and on clinical information originating from patients' records.

Results: More than 360 patients with more than 500 tattoo reactions were systematically examined, supported by biopsy. Clinical photos were taken that clearly illustrate the typical tattoo reactions seen in the clinic. A diagnostic classification system is presented illustrated with photos of typical cases. The project includes a therapy algorithm based on clinical diagnosis (soon to be published). The system shall argue rational therapy such as surgery (especially dermatome shaving), laser treatment and medical approaches. A flow chart (pocket-brochure/app) with suggested treatment modalities will be introduced.

Conclusions: The new classification system based on large patient material and a spectrum of treatments will simplify diagnosis and treatment of tattoo reactions. The aim of the classification system is to be used as a new standard in dermatology.

P8

ADSORPTION OF HEAVY METAL IONS IN TATTOOS INK BY MODIFIED BENTONITE CLAY

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Aim: The aim of this study is adsorption of a heavy metal ion, Cu(II), from aqueous solution by using a new modified bentonite clay.

Methods: Acrylamide, bisacrylamide, bentonite, and L-histidine in the presence of an initiator (azobisisobutyronitrile, AIBN) were mixed and bentonite-acrylamide-histidine (BABH) microcomposites were prepared by bulk polymerization. Characterization studies were performed by SEM, FT-IR, XRD, and BET.

Loading of Cu(II) ions was carried out in a batch system. 100 mL of aqueous solution containing Cu(II) ions (between 10-1000 ppm) was treated with the polymer beads. Investigations were made at pH values between 4.0 and 8.0 and at different temperatures. The amount of the binding Cu(II) was determined by atomic adsorption spectrometer.

Results: Specific surface area of the bentonite and BABH microcomposite was found to be 33.4 and 1.42 m^2/g, respectively.

Cu(II) ions (20 µmol/g) were chelated on these bentonite-acrylamide-histidine (50 µmol/g L-histidine incorporation) microcomposites at pH 5.0 at room temperature. Present your results in a logical sequence in text, table and illustrations.

Conclusions: Bentonite clay has got amazing properties such as absorption of dirt from the skin. One of the dirt is heavy metals include Cd(II), Zn(II), Ni(II), Cr(II), Co(II) and Cu(II) which comes from ink. This newly synthesized bentonite has got stronger adsorption features because of its expanded properties and new functional groups such as histidin. L-histidine is one of the strongest metal coordinating ligands. L-histidine increased the polarity of adsorbency and this caused facilitation adsorptions of both of organic and inorganic substances. It could be an attractive tool for removal of heavy metal ions in the future for dermatologists.

P9

TO CURE BY TATTOOING SCARS?

Camille Gravelier[1]

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Aim: The purpose of this poster is to review the data available on medical tattoo, in connection with pathological skin and burn scars. To ask ourselves the following question: does the tattoo represent a therapeutic interest in scars treatment ?

Methods: Review of the scientific and informal literature on the subject (MeshTerms: Burn, Tattoo, Dermography, Dermopigmentation).

Results: Tattooing is an ancient procedure. Speculation surrounds the tattoo marks seen on the naturally preserved human body from 3300 bce found in a snowfield in the Tyrolean Alps.

In recent years, the practice of tattoo became commonplace and number of tattooed individuals has increased significantly.

Alongside these changes some patients become tattoo seekers on pathological skin. This practice is still marginal and unstructured.

Several studies show that damaged-skin camouflage is increasing quality of life for patients complaining about their physical aspect. However sometimes surgery is refused by patients. So it is important to propose other possibilities.

As regards tattoo most of risks could be avoided by a medicalization of the practices.

Conclusions: Medical tattoo can be used in a lots of skin pathology. But this practice presents advantages as inconveniences that it is advisable to know.

References: This work includes 37 bibliographical references.

P10

COMPLICATIONS WITH BODY ART. BEWARE IF YOU CARE!

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Body art is not without risk. Complications include infections, allergy and scarring. Dissatisfaction and regret are not uncommon. Tattoo removal is painful, tedious, expensive and not always successful and can result in temporary but also permanent pigmentary changes. Tattoos and piercings can interfere with MRI and medical interventions.

Body art should be a well informed decision. It should be done in the best hygienic circumstances, with safe materials and by an experienced and registered professional.

P11

TATTOOING IS AN ART

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A professional tattooist at work.

NB:
Pictures are not included in the programme and abstract book but can be seen on the poster

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